REMARKS

Reconsideration of the present application is respectfully requested.

Claims 1, 2, 15 and 19-21 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Pat. No. 4,576,052 to Sugiyama. For the reasons discussed below, Applicants assert that this rejection is no longer applicable in view of the amendments made to claims 1, 15 and 19.

Amended claim 1 currently recites, *inter alia*:

a reference voltage generation circuit generating a reference voltage supplied to a non-inverting input of said operational amplifier, at least one of said first and second resistors comprising a sensing element of which resistance varies on the basis of a physical quantity with a temperature coefficient of sensitivity, wherein a difference between said first temperature coefficient of resistance and said temperature coefficient of sensitivity is substantially equal to said second temperature coefficient of resistance, and wherein said reference voltage generation circuit sets said reference voltage to a middle potential between said first potential and said second reference potential.

Independent claims 15 and 19 have also been amended in a manner similar to amended claim 1.

Amended claims 1, 15 and 19 now recite inter alia a reference voltage generation circuit that sets a reference voltage to a middle potential between a first potential and a second reference potential to supply the middle potential to the non-inverting input of the operational amplifier. In the exemplary embodiment of the physical quantity detection device of the present invention discussed on page 16, lines 1-11 of the specification and shown in FIG. 1, first and second resistors Ra and Rb are connected in series between two reference potentials Vcc and ground. A feedback resistor Rts is located between the inverting input and the output of the operation amplifier OP1.

The inverting input of the operational amplifier OP1 is also connected to the junction between the first and second resistors Ra, Rb and is therefore supplied with a divided, or middle, voltage V1 of the resistors Ra, Rb. The temperature coefficients of resistance TCR of the first and second resistors Ra, Rb are the same, and the difference between the TCR of the first and second resistors Ra, Rb and the temperature coefficient of sensitivity TCS of the first and second resistors Ra, Rb is approximately equal to the temperature coefficient of resistance TCR of the feedback resistor Rts, also known as TCRts.

In operation, when the resistances of the resistors Ra and Rb vary in accordance with application of a pressure to the diaphragm 10, the operational amplifier OP1 operates to equalize the middle voltage V1 supplied to the inverting input of the operational amplifier OP1 to the reference voltage Vref, so that the intensity of the current flowing into the inverting input of the operational amplifier OP1 varies with variation in resistance of the resistors Ra and Rb. The operational amplifier OP1 outputs the output voltage V2 such that a current flowing through the feedback resistor Rts cancels this current. Then, the output voltage V2 represents the variation in the resistances of the resistors Ra and Rb. (See, for example, page 17, lines 4-17).

Sugiyama discloses in FIG.. 4 a temperature independent semiconductor transducer with a strain sensitive region including strain gages 21-24, an operational amplifier 5, and a parallel-connected resistor 81 (feedback resistor) that is integrally formed on a silicon substrate 1. Sugiyama also discloses that the difference between a temperature coefficient of resistance and the temperature coefficient of sensitivity of each of the strain gages 21-24 becomes substantially the same as the temperature coefficient of resistance of the parallel-connected resistor 81 (see col. 6, lines 43-52).

However, in Sugiyama, the non-inverting input 29 of the operational amplifier 5 is not supplied with a middle potential of the first and second reference potentials. Rather, an output terminal 27 for outputting a voltage signal from the bridge circuit that is proportional to an applied pressure is connected to the non-inverting input of the operational amplifier. Also, a resistor Rf 82 is located between ground and the non-inverting input. Therefore, as Sugiyama fails to disclose a reference voltage generation circuit that generates a reference voltage of a middle potential supplied to a non-inverting input of the operational amplifier, it does not anticipate the physical quantity detection device recited in amended claims 1, 15 and 19.

In view of the above noted differences between the present invention and Sugiyama, Applicants respectfully request that the Examiner's §102(b) rejection of claims 1, 15 and 19, as well as claim 2 that depends from claim 1 and claims 20 and 21 that depend from claim 19, be withdrawn.

Claims 3, 14, 17 and 18 have been rejected under 35 U.S.C. §103(a) as being obvious in view of Sugiyama. However, as these claims depend either directly or indirectly on claim 1, these claims are allowable for the same reasons discussed above in connection with claim 1. Therefore, Applicants respectfully request that the Examiner's §103(a) rejection of these claims be withdrawn.

Claim 4 has been rejected under 35 U.S.C. §103(a) as being obvious in view of Sugiyama and Sato. However, as this claim depends either directly or indirectly on claim 1, it is allowable for the same reasons discussed above in connection with claim 1. Therefore, Applicants respectfully request that the Examiner's §103(a) rejection of claim 4 be withdrawn.

Claims 6 and 7 have been rejected under 35 U.S.C. §103(a) as being obvious in view of Sugiyama and Kato.

Claim 6 is allowable due to its dependency on amended claim 1. Claim 7 is also now allowable, as it has been amended into independent form and to recite inter alia the reference voltage generation circuit recited in amended claim 1. Neither Sugiyama nor Kato, considered singly or in combination, teaches or suggests such a configuration.

Therefore, in view of the above differences between the present invention as recited in claims 6 and 7 and the cited art, Applicants respectfully request that the Examiner's §103(a) rejection of claims 6 and 7 be withdrawn.

The Examiner has indicated that claims 8-12 would be allowable if rewritten in independent form. This indication of allowability is noted and appreciated. In response, Applicants have amended claim 8 into independent form. As claims 9-12 depend either directly or indirectly from claim 8, Applicants submit that claims 8-12 are now in allowable form.

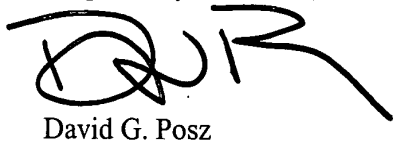
The Examiner has also allowed claims 13 and 16. The allowance of these claims is noted and appreciated.

The Examiner should note that new claims 22 and 23 have been added. New claim 22 recites inter alia feedback resistor means connected between the inverting input and the output of the operational amplifier and includes a plurality of resistance elements for feedback resistance and a second TCR. Claim 23 recites that at least of the resistor elements comprises a trimming structure in resistance. Applicants submit that both of these new claims are patentable over the art of record.

In view of the above amendments and remarks, the present application is now believed to be in condition for allowance. A prompt notice to that effect is respectfully requested.

A petition for a two-month extension of time along with a check for the requisite petition fee is being submitted concurrently with the present amendment. Although no additional fees are believed to be due, permission is given to charge any additional unforeseen fees to Deposit Account 50-1147.

Respectfully submitted,



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